

Guide to the Lichens of the New York Area—Part 4*

G. G. NEARING

Group 6. The Larger Shield Lichens. Mats of paper-like structure growing close to the foothold, or the tips and margins rising somewhat from it. Dividing into radiating trunks more or less branching and lobed, or the central parts uniting in a confused fabric, some of the branches or lobes usually broader than 5 mm. Fruits brown, sometimes purplish or greenish. Spores undivided, colorless. Algal cells not in chains.

This group is distinguished from all other large Papery Lichens by the undivided, colorless spores, but as many of the species commonly fail to fruit, characters other than the spores must be stressed. Foreign lichenists have attempted to substitute chemistry for botany in separating the species of this and of other puzzling groups. Since the two most noted American lichenists, Tuckerman and Fink, have declined to recognize chemical determinations, we may assume that the American tradition permits us to use the botanical, thereby avoiding the added confusions which result from chemical methods.

Parmelia saxatilis STANE-RAW

A common tree-lichen, found in swamps, woods and highlands, everywhere that lichens grow; also seen at times on rocks. It forms

* It is the aim of this Lichen Guide to enable those who have no special knowledge of lichens, to identify the majority of the more common species, and all the more conspicuous ones, without technical study and, if necessary, without the use of a compound microscope. If it were possible to accomplish this by brief and concise keys, the detailed descriptions here would be unnecessary. But if such keys could be written, it would not have remained for me to write them.

Therefore, as a substitute for the ordinary key, I have adopted a system of grouping and cross-reference, to be used as follows: First decide whether the lichen is Stalked (Groups 1 to 4), Papery (Groups 5 to 12), Flake (Group 13) or Crust (Groups 14 and on). Then read the description of each group head in that division, select the most likely group, and look over the illustrations. If an illustration looks like the specimen, read the description, noting especially the comparisons which follow it. If the description does not agree with the specimen, one of the species compared with it probably will. This method, though inexact, will accomplish the purposes of a key, and because the descriptions are given in repetitive detail, should prevent wrong determinations.

flat rosettes very variable in shape and size, but often 10 cm. or more across, and with branches up to 7 or 8 mm. wide, though usually much narrower. The substance is thin, and the margins may curl upward slightly, especially in much wrinkled forms. The shining greenish gray upper surface is wrinkled in a net-like pattern, with shallow pits between the raised wrinkles. Brownish granules are often strewn along these wrinkles, and in var. *furfuracea* they lengthen into minute prongs or coral-like growths, often massed all over the center of the lichen. The under surface is black, with many short, black, root-like holdfasts, often dense to the very tip.

Fruits, not often seen, are deeply saucer-shaped, chestnut-brown, with a rim often roughened and warty. Spores undivided, colorless, 10 to 20 by 7 to 12 microns.

Parmelia saxatilis is one of the few rosette lichens with a net-like pattern of pits and wrinkles, and though this marking may be faint, it usually serves to distinguish the species from all others, for the pitted members of *Cetraria* (Group 4) and *Sticta* (Group 7) tend to raise at least their tips free from the footholds, while *P. saxatilis* usually lies flat. The other typically pitted lichens also have the under surface pale in contrast with the black of this species and its conspicuous black holdfasts. Though var. *furfuracea* may look at first glance like the paler *Cetraria aleurites* (Group 5), the black under surface will distinguish it at once. The most likely confusion is with *P. sublaevigata*, a subspecies of *P. tiliacea* in some respects intermediate between the two species. Typical *P. tiliacea*, which has the margins curled downward, and parallel wrinkles across the larger trunks, and which commonly bears many fruits, could hardly be mistaken for typical *P. saxatilis*, but intermediate forms between these two common lichens are sometimes difficult to name, and the invention of a subspecies, as usual in such cases, only increases the difficulty, making two series of intermediates in place of one. *P. Borreri* and *P. rudecta* sometimes appear slightly pitted, but can be distinguished by their larger size, flat, round, white soredia rather regularly studded over the upper surface, and by the under surface being brown rather than black. *P. omphalodes*, a small, brown form of *P. saxatilis* growing on rocks in the north, need not be described here because it does not occur in the New York area.

Because of the variability of *P. saxatilis*, and because it is often sterile, it presents difficulties in conjunction with other species of this group, which are best solved by learning the typical forms of the long-recognized species, rather than by giving names to the confusing intermediate forms. Yet some of its variations are so striking in appearance that they require separate description to make identification possible. *P. saxatilis* is further discussed in relation to *P. tiliacea* under that species.

Parmelia sulcata. FURROWED SHIELD LICHEN

Also called *P. saxatilis* var. *sulcata*, or var. *rosaeformis*. Though actually only a phase of *P. saxatilis*, this lichen has an appearance so striking and so easily recognized, that it may be treated as a subspecies for the sake of emphasis. It is larger, sometimes 20 cm. across, and with branches 1 cm. wide. The margins and ridges are studded with raised, dusty, white soredia, lengthened or ranged in lines accenting the net-like pattern. In the rare cases where fruits are found, soredia may cover the rims. In no other respect does it differ from *P. saxatilis*.

Somewhat similar arrangements of soredia are seen on *Sticta pulmonaria* (Group 7), but that species has the under surface nearly white, and the pits are much deeper, with rounded, instead of angular ridges between. *Parmelia sulcata* is not easily mistaken for any other lichen.

Parmelia frondifera

A name recently given to a rare, freakish development of *P. saxatilis*, in which the tiny prongs of coral-like growth characteristic of var. *furfuracea* become flattened into miniature lobes more or less covering the lichen. This modification is probably no more worthy of being named a species than are the fasciated forms of some higher plants, but it does give a decidedly different appearance suggesting *Physcia aquila* var. *detonsa* (Group 8), which, however, is moss-green or brownish, and *Panmaria microphylla* (Group 10) which is greenish brown. Both these species have a dull surface, contrasting with the smooth and somewhat shining texture of *Parmelia frondifera*.

Parmelia tiliacea. LINDEN LICHEN

Also called *P. quercina*. An extremely variable lichen found commonly on trees and occasionally on rocks, anywhere that lichens grow, but particularly abundant in swamps. It forms typically flat rosettes, which may reach 10 cm. or more across. The trunks are often thickened, slightly arched, and crossed by warty wrinkles. The manner of branching varies greatly, but often where two lobes meet, their sides touch or overlap slightly, while the sinus between them may show as an almost circular opening, a pattern typical of few other lichens. Lobes may be wider than 5 mm. or much narrower, and some forms are so small that they might belong with the Smaller Shield Lichens (Group 5). The upper surface is greenish or bluish gray, the under is black, often dark brown near the margins, with many short, black, root-like holdfasts.

Fruits are usually abundant, up to 12 mm. in diameter, irregularly saucer-shaped, chestnut to ocher-brown, usually shining, with a thin, smooth to broken or toothed rim. Spores undivided, colorless, 5 to 11 by 4 to 7 microns.

Most of the small or medium sized Shield Lichens found on trees (these must not be confused with the still smaller and rather more common Blister Lichens, Group 8) are either *Parmelia tiliacea* or *P. saxatilis*. The many black holdfasts on the black under surface of both these species distinguish them at once from all the Smaller Shield Lichens except their own subspecies. The puffed forms, *P. physodes* and *P. colpodes* (Group 5), are sufficiently distinguished by their puffed or thickened tips, and though black beneath, have few holdfasts. The Larger Shield Lichens also fail to show any species with comparable abundance of black holdfasts, except *P. perforata* and its subspecies, which are much larger, with raised tips and black, marginal hairs. The Blister Lichens (*Physcia*, Group 8) have mostly small, blackish or gray fruits, and dark 2-celled spores.

The most important character for separating *P. tiliacea* from *P. saxatilis* is the absence of any regular pitted pattern on the upper surface of *P. tiliacea*. The branches of *P. tiliacea* are also shorter and broader, with a tendency to progress in wave-like humps rather than stay flat, but the small form called *P. sublaevigata* spreads in long, flat, fern-like branches which, unless fruited, somewhat

resemble *P. saxatilis*. *P. tiliacea* will usually fruit when larger than 5 cm. across, and is then more easily distinguished from *P. saxatilis*, which seldom fruits.

These two species may also grow on rocks, where they somewhat resemble the more common *P. conspersa*, which has a yellowish tint, and an under surface usually brown, with comparatively few holdfasts.

P. perlata, *P. perforata*, and their subspecies are distinguished by the larger size of their parts, and the tendency of their tips to lift away from the foothold. *P. rudecta* and *P. Borreri*, also larger, have the upper surface dotted with tiny white soredia, and the under surface drab, with few holdfasts.

Parmelia tiliacea var. *sublaevigata*

Also called *P. sublaevigata*. A variety or subspecies hardly distinct from *P. tiliacea*, but mentioned and illustrated to show the limits to which the species may vary. It radiates in flat, regularly branching trunks reaching a length of 4 or 5 cm. without much overlapping or intermingling. Sometimes it resembles *P. saxatilis*, but lacks the net-like pattern on the upper surface.

Parmelia tiliacea var. *isidioidea*

A name sometimes given to a rather common and often large form of the species, growing on trees and rocks especially in western New Jersey. Though typical *P. tiliacea* has no soredia, granules, or coral-like growths, this variety has the shorter lobes and more central parts humped up, and bearing on their summits crowded hollow warts about 0.2 mm. across, often opening crater-like, or again breaking down in pale, powdery soredia. Fruits are rare. This variety approaches *P. Borreri*, but the soredia are closely clustered instead of scattered, are distinctly wart-like instead of flat, and the black under surface is covered with black holdfasts. Or it might be taken for a small form of *P. caperata*, which often has similar sorediate warts on its ridges, but the blue-gray color is wholly unlike the pale yellow of *P. caperata*, which also has few holdfasts. However, it is one of the most puzzling forms of this difficult group, and different opinions may well be held regarding it.

Parmelia conspersa. BOULDER LICHEN

The most frequent and conspicuous of all lichens that grow on stone. Seen on boulders, stone fences, cliffs, and occasionally the roots of trees, in shade or full sun. In size it varies from dwarfed rosettes 4 or 5 cm. across, with parts hardly more than 1 mm. wide, to mats that spread a meter or more over the rock, with little to show whether it is all a single lichen reviving again where old and broken, or a number of lichens tangled together. The humped branches grow over each other shingle-fashion, and may end in blunt lobes more than 5 mm. wide, or more commonly divide into many narrowed and pointed tips. So tangled and confused are the parts that the trunks cannot usually be traced or measured. There may be abundant fruits or none. Nearly the whole lichen may be lost under dense coral-like growths 2 or 3 mm. high. Or the lichen may be reduced to a few straggling unconnected tips scattered over the rock.

The upper surface has nearly always a yellowish tint toward the tips, which are pale, but the older central parts may blacken or turn olive-green, or sometimes burn brownish in the sun. The tips are usually pale yellowish or greenish, smooth and shining. The under surface, commonly brown, but sometimes turning brownish black, shows a few dark, root-like holdfasts.

Fruits, often many and crowded, are saucer-shape, up to 12 mm. across, dark brown, purplish or greenish, the rims nearly smooth or toothed. Spores undivided, colorless, 8 to 12 by 4 to 7 microns.

If you glance at a rock covered with Papery Lichen and say it is *P. conspersa*, you will be right most of the time, because this species is common everywhere. On closer examination, the characters to remember are shining, pale yellowish tips which mostly turn downward and touch the rock; also a brown under surface with comparatively few holdfasts. *P. caperata* has similar coloring, but the upper surface, instead of shining, has a texture like kid leather, the lobes are much broader, the tips wavy margined, not pointed, and instead of the coral-like growths, it has small warts dusty with yellowish soredia. *P. saxatilis* and *P. tiliacca* are distinct in their lack of any yellow tint, and in their black, rather than brown under surface, with many black holdfasts. *P. Borreri* and *P. rudecta* also occasionally grow on rocks. They are dis-

tinctly blue-gray, and dotted with very tiny, flat, white soredia. *P. perlata*, *P. perforata* and their subspecies are easily distinguished by the tips, which rise usually 1 cm. or more clear of the rock, and by their frequent lumpy, white soredia or black hairs along the margins. *P. centrifuga*, found only in the north, has uniformly narrow branches, with pale under surface. Species of *Physcia* (Group 8) may be recognized by their small size, dull surface, and small blackish or gray fruits, never shining. *Sticta amplissima* (Group 7) has broad parts and light red fruits, and turns bright green when wet, as does *Dermatocarpon aquaticum* (Group 12), which is of more leathery texture, with a dull gray surface. These are the Papery Lichens most frequently found growing with *P. conspersa*.

Parmelia Borreri. BORRER SHIELD LICHEN

Instead of describing this fairly common lichen, it is simpler to consider only its much more plentiful variety *rudecta*, here named as a subspecies. For *P. rudecta* has become so widely known under that name, that to return it where it properly belongs, as a variety of *P. Borreri*, would not help the popular comprehension of lichens. There is no difference between the two, except the absence in *P. Borreri* of the central coral-like growths so conspicuous in *P. rudecta*.

Parmelia rudecta. ROUGH SHIELD LICHEN

Also called *P. Borreri* var. *rudecta*. The commonest of the conspicuous rosette lichens on tree-bark, and sometimes seen on rocks; forming more or less circular patches visible at a distance of many meters, along the roadside or in open woodland anywhere. It often spreads 15 cm., occasionally 30 cm., covering the bark almost completely without much overlapping of the parts, for the lobes are flat and wide, and their edges, meeting, tend to grow together, leaving few traceable trunks or older branches. The center of the lichen is more or less covered with granules and coral-like growths, which may form a crust 3 or 4 mm. thick, appearing thicker where the bark is lumpy. Lobes are as much as 1 cm. wide, rounded, but often with finely cut margins, which, however, lie flat, the upper surface pale blue-gray, often with a



PLATE 7

Fig. 1. *Parmelia saxatilis*, pale gray.

Fig. 2. *P. saxatilis*, tip showing black holdfasts.

Fig. 3. *P. sulcata*, showing ridges of soredia.

Fig. 4. *P. frondifera*, covered with miniature lobes.

Fig. 5. *P. tiliacea*, pale gray.

Fig. 6. *P. tiliacea*, with irregular fruits.

Fig. 7. *P. tiliacea* var. *sublaevigata*, fragment showing long branches.

Fig. 8. *P. tiliacea* var. *isidioidea*, blue-green with soredia.

Fig. 9. *P. conspersa*, yellow gray.

Fig. 10. *P. conspersa*, with coral-like growths.

Fig. 11. *P. conspersa*, fragment of a form with broad tips.

Fig. 12. *P. conspersa*, spores.

purplish iridescence when wet. There is a slight tendency toward netted wrinkles as in *P. saxatilis*, but these are vague. Sprinkled everywhere on the smooth and rather shining surface, are white dots of soredia averaging perhaps 0.05 mm. in diameter, and hardly visible without a lens. These may lie perfectly flat, but are usually slightly raised on older parts. The under surface is smooth, pale drab at the tips, sometimes darkening, and occasionally almost black toward the center, where it is shaggy with drab holdfasts.

Fruits, rarely seen except on very large specimens, are irregularly cup-shaped, dark brown, up to 5 mm. across. Spores undivided, colorless, 10 to 16 by 6 to 9 microns.

The central rough crust, and the pale, blue-gray color, dotted with tiny, white soredia, will distinguish *Parmelia rudecta* from all other lichens, after a little observation, and the smooth, pale under surface of the tips usually prevents confusion with *P. saxatilis* var. *furfuracea* and *P. tiliacea* var. *isidioidea*, which are black beneath. Another lichen with the central coral-like growths is *Cetraria aleurites* (Group 5), without blue-gray color or white dots. *P. Borreri* lacks the central crust, but the other characters are identical with *P. rudecta*, and there is little chance for confusion. Yet *Sticta amplissima* (Group 7) has found its way into herbaria under the label of *P. Borreri*, and the differences should be carefully noted. *Sticta amplissima* is pinkish gray or pearl-gray, with plentiful light red fruits. The upper surface is smooth, or stretched into wrinkles and has no white dots. The under surface is clothed with a pale felt. In the field, it is only necessary to wet the *Sticta*, which will almost immediately turn deep grass-green. *P. Borreri* turns color hardly at all when wet, becoming somewhat more blue or purplish. *P. perlata* is sometimes mistaken for *P. Borreri*, especially as it may have small, faint dots on the upper surface. The raised margins, often edged with lumpy soredia, and the black under surface, chestnut-brown at the tips, should suffice to distinguish it.

Parmelia caperata. WRINKLED SHIELD LICHEN

A rival of *P. rudecta* for the frequency with which it is seen on trees, and certainly without rival for showiness, whether on bark, or with *P. conspersa* on boulders. Roadside oaks are often blanketed with its pale lemon-yellow mats 30 or 40 cm. across, reach-

ing far up the boles and over the larger boughs. You can see them plainly from a passing car. The radiating branches and lobes, usually about 1 cm. wide, lie fairly close to the foothold, especially at their tips, but crowd each other into ridges and mounds often 1 cm. high. The tips spread out as much as 2 cm. wide, shallowly lobed and with scalloped margins. The pale yellowish upper surface is not quite shining, but rather of the texture of kid leather. Older parts darken to yellowish gray or grayish olive, often over-spread with pale, new tips from another direction. Besides the larger wrinkles, this lichen has small ones, about 2 to the mm., beginning a little back from the tips and flowing with the direction of growth, or again spreading irregularly and crossing each other. The higher ridges may break into warts dusted with yellowish soredia. The under surface is black with very short black holdfasts, but at the tips becomes shiny brown, without holdfasts, or with the holdfasts reduced to dots.

Fruits are very rare, up to 12 mm. across, saucer-shape, chestnut-brown, with a wavy and often warty rim. Spores undivided, colorless, 13 to 20 by 7 to 10 microns.

The same tree will often show *Parmelia caperata* and *P. rudecta*, with their contrasted shades of pale yellow and pale blue-gray. This difference in color is usually sufficient distinction, but *P. rudecta*, for further contrast, has white dots scattered over the upper surface, and a pale drab under surface. Small specimens might be confused with *P. tiliacea* var. *isidioidea*, which, however, is always blue-gray or blue-green. *Sticta amplissima* (Group 7), an infrequent lichen in the New York area, forms very large, somewhat similar rosettes, which are pinkish gray with many light red fruits, and turn deep grass-green when wet. If on rocks, *P. caperata* must be separated from *P. conspersa*, of similar color, by its wider, less shining tips, by its black under surface, and by its small, rather regular wrinkles. Few other lichens reach comparable size. *Sticta pulmonaria* (Group 7) is pale brownish both above and beneath, and deeply pitted. *Parmelia perlata*, *P. perforata* and their subspecies have tips which rise 1 cm. or more from the foothold, and none are yellow except the rare *P. sulphurata*, which is sulphur colored also within, as seen when broken, and probably not found in the New York area. (*P. caperata* is white within.) The yellow of *P. caperata*, which is very pale, must

not be confused with the bright yellow and orange tints of the much smaller lichens in Group 9.

Parmelia perlata. BROAD SHIELD LICHEN

Seen occasionally in the highlands, particularly on rocks, where it stands out by the breadth of its lifted lobes, often 2 or 3 cm. across, and rising 1 cm. from the foothold. It spreads in crumpled sheets rather than by trunks and branches, and may be 20 cm. across or more. The upper surface is smooth, pale greenish gray, the margins often thickened by masses of whitish soredia. The under surface is black, shining brown near the margins, smooth, or with a very few black, root-like holdfasts.

Fruits are rather rare, up to 12 mm. across, saucer-shape, chestnut-brown, with a thick, smooth rim. Spores undivided, colorless, 10 to 17 by 6 to 10 microns.

Parmelia perlata is not too easily determined, yet the real species with which it can be confused are few. It resembles the somewhat smaller *Cetraria glauca* (Group 4), which, however, has frequent coral-like growths on the often torn and jagged margins, and shows a net-like pattern of pits and wrinkles on the upper surface. *Sticta amplissima* and *S. pulmonaria* (Group 7) are pale and felted beneath. The only other lichen of similar color with wide, lifted tips is *P. perforata*, including its subspecies, with black hairs along the margin. Some botanists have allotted a few marginal hairs to *P. perlata*, but Tuckerman follows the older lichenists in insisting that *P. perlata* has no marginal hairs, and thus we have a simple means of differentiating the two species.

Parmelia perforata. RAGGED SHIELD LICHEN

On the bark of trees in swamps and bogs, often high up, out of reach, sometimes on rocks, not common, but to be met throughout the New York area. Though not usually forming large rosettes, it is conspicuous for its wide lobes with ragged and fringed margins. The tufts are irregular in shape, often 15 cm. across, with no clearly radiating trunks or definite branches. The tips rise as much as 2 cm. clear of the foothold, and bear conspicuous black hairs along their crinkled margins. The upper surface is smooth, greenish gray or pale olive, the under surface typically black, wrinkled, covered in places with large, black, root-like holdfasts.

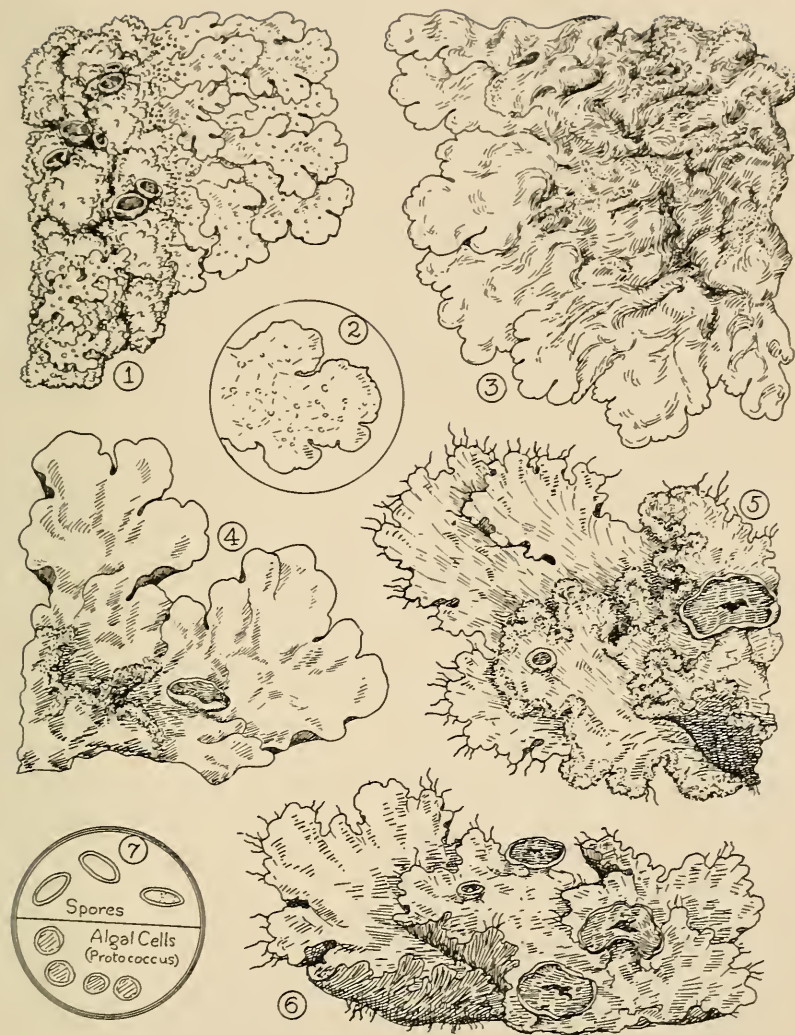


PLATE 8

Fig. 1. *Parmelia rudecta*, blue-gray.

Fig. 2. *P. rudecta*, tip showing white dots.

Fig. 3. *P. caperata*, yellow-gray.

Fig. 4. *P. perlata*, blue-gray.

Fig. 5. *P. perforata* var. *cetrata*, greenish gray.

Fig. 6. *P. perforata*, greenish gray.

Fig. 7. *P. perforata*, spores.

When the under surface is pure white or pale brownish, the lichen is usually referred to its subspecies, *P. hypotropa*.

Fruits frequent, as much as 2 cm. across, lifted on spurs sometimes 1 cm. high. They are cup-shape, flat or irregular, with a thin, wavy rim, and in the center usually a torn hole. Spores undivided, colorless, 9 to 14 by 6 to 8 microns. They sometimes appear vaguely 2-celled.

Parmelia perforata can be determined easily as the only Shield Lichen with hairs on the margin and holes in the fruits. In fact, no comparable Papery Lichen has this combination of characters. The only other local Shield Lichen with marginal hairs is *Cetraria ciliaris*, with much more finely divided lobes, and with blackish granules scattered along the margin. The only other with perforated fruits is *C. lacunosa*, which has a net-like pattern of pits and wrinkles seldom seen in *P. perforata* and no marginal hairs.

But because *P. perforata* is variable, it has been divided unnecessarily into several subspecies, which are here described briefly to avoid confusion in case it is desired to study the group further. All are alike distinct from other lichens, with ragged hairy margins lifted high, and frequently, but not always, with central holes in the fruits. For most purposes it is sufficient to name them all *P. perforata*, and if desired, to add these names as varieties, for they were so listed by Tuckerman.

Parmelia cetrata differs from *P. perforata* only in having lumps of dusty soredia ranged along the margins. In this respect it approaches *P. perlata*, from which it is distinguished by the marginal hairs and perforated fruits.

Parmelia hypotropa has soredia like *P. cetrata*, but the under surface is, at least in part, pure white or pale brown, blackening toward the center. In this it approaches *Cetraria lacunosa*, but the marginal hairs and soredia distinguish it.

Parmelia crinita is densely covered with minute granules or coral-like growths. The rare fruits are usually without any central hole, and have soredia on the rims. Spores also are larger, 17 to 22 by 9 to 15 microns. This may perhaps deserve to rank as a distinct species, but as it is rare in the New York area, it may more conveniently be considered a subspecies or variety.

(Group 7, the Leather Lichens, will include *Sticta*, *Nephroma*, *Solorina* and *Peltigera*.)